Fire Effects Monitoring in the Central and Southern California Parks

AFTER NEARLY A CENTURY OF fire suppression and hazardous fuel accumulation on our nation's wildlands, the National Park Service is one of the first agencies to actively manage fire use and examine its effects on natural resources.

This progressive land management policy led to the creation of the NPS Fire Monitoring Handbook (FMH). The FMH program was developed to "provide a system to document burning conditions and fire behavior, ensure fires remain within certain conditions, verify completion of burn objectives, and follow long-term trends." Since its development, the program has served as a model for other land management agencies and organizations to base their fire effects monitoring systems on.

SERVING SIX PARKS

The Central and Southern California Fire Effects Program serves the fire monitoring needs of Channel Islands National Park, Golden Gate National Recreation Area, Joshua Tree National Park, Pinnacles National Monument, Point Reyes National Seashore, and Santa Monica National Recreation Area. The program is staffed by a crew of biological science technicians that measures vegetation plots in prescribed fire burn units, provides support to operations during prescribed fires, and assists in fire research projects within the six parks.

VEGETATION MONITORING

The primary focus of the Fire Effects Program is to install and maintain monitoring plots in prescribed burn units and areas of alternative fuel treatments. Within the six parks, the program maintains a network of 388 treatment and control plots. These vegetation plots are classified as grassland, brush, and forest vegetation types, and stratified by dominant plant communities.

The plant communities monitored are very diverse. They include coastal prairie on Channel Islands and the Point Reyes peninsula, redwood forest at Muir Woods, chamise shrubland in Pinnacles, oak woodland in the Santa Monica Mountains, and Joshua tree forest in the high Mojave desert.

The fire effects crew measures vegetation attributes on the plots such as species occurrence, relative cover, density, and fuel accumulation. They also monitor burn severity immediately following prescribed fire treatment and vegetation attributes in subsequent years following the treatment.

The data collected by the fire effects crew is input into the FMH database, a data archive that can be accessed by fire monitors, ecologists, and managers for data analysis. The analysis examines the effects of prescribed fire treatment on attributes of plant communities such as species composition, density, and regeneration. This enables ecologists and managers to evaluate long term effects of fire use on plant community composition and structure. Furthermore, the data analysis assists in determining whether or not the prescribed fire treatment accomplished management objectives. This process provides feedback that helps managers refine goals, objectives, and prescriptions for treatment.

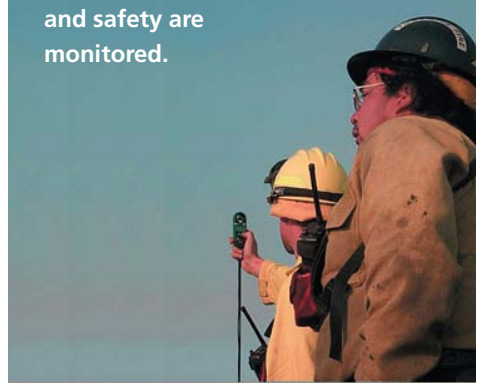
PRESCRIBED FIRE MONITORING

As support staff for prescribed fire operations, the monitoring crew assists with burn preparation by installing and measuring fire effects plots, providing GIS support, and prepping control plots. During prescribed burns, the monitors report hourly weather observations, monitor smoke dispersal, and record fire behavior observations. They also serve as lookouts for firefighter safety. After the burn, the monitors conduct a post vegetation survey, measure burn severity on fire effects plots, and prepare a report for the fire management officer summarizing weather, smoke and fire behavior, and whether vegetation objectives were met.

FIRE RESEARCH SUPPORT

The fire effects monitoring crew also provides fire research support. During the 2001 field season, the monitoring crew worked on three research projects at Point Reyes National Seashore and Golden Gate National Recreation Area. The crew collected the pre-burn data for a velvet grass study, examining the effects of fire treatment on the persistence of a non-native grass. They assisted in post-burn data collection for a Scotch broom study, examining fire effects on non-native shrub eradication. The crew also participated in the design and data collection for a research project comparing four methods of quantifying fuel loading in the *Baccharis* (coyote-brush) shrub type.

The fire effects program bridges the gap between fire and resource management, playing a critical role in the development of prescriptions for fire and alternative fuel treatments.



Vegetation data is collected pre-burn, post-burn, and at 1, 2, 5, and 10 year intervals.

During a burn, weather, fire behavior, smoke, and safety are monitored.

Sediment Cores Reveal Fire History

A THREE-YEAR STUDY OF SEDIMENT CORES FROM two locations at Point Reyes National Seashore completed in December 2001 has substantially broadened current understanding of fire history on the Point Reyes Penninsula.

The investigation, led by Dr. R. Scott Anderson of Northern Arizona University, is an example of the type of research called for in the National Fire Plan, aimed at helping land managers understand the frequency of fire in landscapes over time.

Charcoal particles in an 11-meter core from Wildcat Lake and a 4-meter core from a wetland known as Glenmire demonstrate evidence of fire history in two different plant communities within the Seashore. The study cannot distinguish between lightning and human-caused fire.

Wildcat Lake is surrounded by coastal scrub, dominated by California sage brush, coyote brush and California coffeeberry. Glenmire is located in a closed canopy Douglas fir forest with an understory of California laurel, mixed oak, California hazel and California huckleberry.

In the charcoal analysis, each core was divided into several zones based on concentration of charcoal fragments. Different levels within each core were then dated to establish a timeline for fire events. When plant fragments were available, a C-14 radiocarbon dating technique was used. Four of the dates were established using Accelerator Mass Spectrometry (AMS). The longer Wildcat core was shown to represent 3,100 years and was divided into 4 zones; while the shorter Glenmire core was shown to represent a period of 7,000 years and was divided into 5 zones.

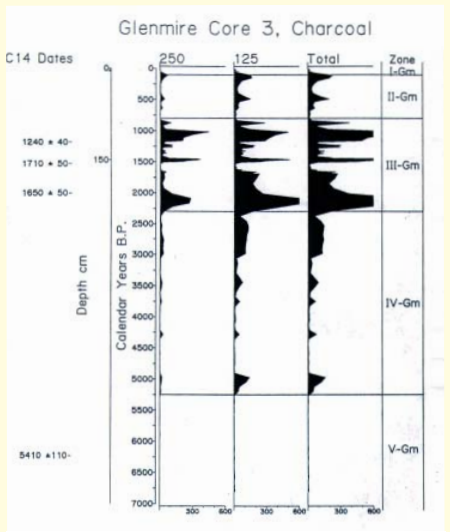
Earlier tree ring fire scar research (Brown, et al., 1999) has demonstrated fire exclusion beginning in approximately 1905 at Five Brooks, 1918 at Limantour and 1945 at Pine Gulch. The upper zone of each of Anderson's sediment cores had the least amount of charcoal, verifying the near absence of fire during the last 100 years.

The Wildcat core showed the highest amount of charcoal in Zone 2 from the period 100-900 years ago, while the Glenmire core showed the highest amount in Zone 3 from 800-2,300 years ago.

Supported by achaeological research demonstrating extensive use of the coastal environment by Native Americans back at least 3,000 years, the sediment study suggests that prescribed fire may have been applied alternately in different vegetation types. Combined with the results of other fire studies, these data futher suggest that Point Reyes may have had fire intervals of 7-14 years prior to the period of fire exclusion.

Well preserved pollen was also found within the cores. Analysis of the pollen will provide information on vegetation changes that occurred during the time period the charcoal was deposited.

Dr. Anderson returned in May 2002 with a team of graduate students to collect four additional cores. These cores will also undergo charcoal and pollen analysis.



The charcoal in the Glenmire Core is divided into five zones which represent different time periods in the fire history of the site.

Websites

National Park Service Fire Program
www.nps.gov/fire
National Interagency Fire Center
www.nifc.gov
National Fire Plan
www.fireplan.gov
Fire Effects Information
www.fs.fed.us/database/feis
California Association of Fire Ecology
www.ice.ucdavis.edu/cafe
Fire Ecology Database
www.talltimbers.org/feco.html